

PCTWORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61K 35/78, 7/48 // (A61K 35/78, 31:20)		A1	(11) International Publication Number: WO 98/17293 (43) International Publication Date: 30 April 1998 (30.04.98)
(21) International Application Number: PCT/EP97/05510 (22) International Filing Date: 7 October 1997 (07.10.97)		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).	
(30) Priority Data: MI96A002149 17 October 1996 (17.10.96) IT		(72) Inventors; and (75) Inventors/Applicants (<i>for US only</i>): BOMBARDELLI, Ezio [IT/IT]; Via Val di Sole, 22, I-20141 Milano (IT). CRISTONI, Aldo [IT/IT]; Viale Ortles, 12, I-20139 Milano (IT). MORAZZONI, Paolo [IT/IT]; Viale Ortles, 12, I-20139 Milano (IT). SEGHIZZI, Roberto [IT/IT]; Viale Ortles, 12, I-20139 Milano (IT).	
(74) Agent: MINOJA, Fabrizio; Bianchetti Bracco Minoja S.r.l., Via Rossini, 8, I-20122 Milano (IT).		Published <i>With international search report.</i>	
(54) Title: PHARMACEUTICAL AND COSMETIC ANTIACNE FORMULATIONS CONTAINING PLANT EXTRACTS (KRAMERIA TRIANDRA OR MESUA FERREA)			
(57) Abstract			
<p>The present invention relates to novel pharmaceutical and cosmetic formulations with antiacne activity containing: a) an antimicrobial hydrophilic extract of Krameria sp., or a pure compound from said extract and/or an antimicrobial lipophilic extract of Mesua ferrea; b) ximeninic acid and/or lauric acid; c) anti-inflammatory saponins extracted from Olax dissitiflora, Aesculum hippocastanum, Centella asiatica, Terminalia sericea, Glycyrrhiza glabra.</p>			

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

PHARMACEUTICAL AND COSMETIC ANTIACNE FORMULATIONS CONTAINING PLANT EXTRACTS (KRAMERIA TRIANDRA OR MESUA FERREA)

The present invention relates to novel pharmaceutical and cosmetic formulations with antiacne activity containing:

- a) an antimicrobial hydrophilic extract of Krameria sp., or a pure compound from said extract and/or an antimicrobial lipophilic extract of Mesua ferrea;
- b) ximeninic acid and/or lauric acid;
- c) antiinflammatory saponins extracted from Olax dissitiflora, Aesculum hippocastanum, Centella asiatica, Terminalia sericea, Glycyrrhiza glabra.

PRIOR ART

It is known from literature (Martindale, "The extrapharmacopeia", 28th Ed. (1982); Cannizaro, Boll. Soc. Ital. Biol. Sperim. 1,22, 1964; V. Hoppe, Drogenkunde Bd1 Walter De Gruyter Ed., 1975; and British patent 2.184.353 A) that the extracts obtained by extraction with chlorinated solvents, aliphatic ethers and ketones as well as aliphatic and aromatic esters, from the roots, the bark of the trunk and the leaves of different species of Krameria, preferably Krameria triandra, enriched in neolignanes (particularly Eupomatenoid 6 and 2-(2,4-dihydroxyphenyl)-5-propenylbenzofuran) have antimicrobial activity against gram +, gram - bacteria, fungi and anaerobic strains.

These extracts, although obtainable by extraction even with protic solvents, are naturally hydrophilic due to the phenolic character of their active components.

The pure components Eupomatenoid 6 and 2-(2,4-

2

dihydroxyphenyl)-5-propenylbenzofuran can be recovered from these extracts using chromatographic techniques on silica gel, as reported in EP 0 464 297 B1.

From the flowers, particularly from the buds, of 5 Mesua ferrea, extraction with aprotic solvents such as hexane, methylene chloride or better with carbon dioxide in hyper-critic conditions, for example extracting the vegetable material under pressures ranging from 110 to 260 bar, mainly at 200 bar and at temperatures ranging 10 from 35 to 65°C, preferably at 45°C, yields a lipophilic extract containing substituted coumarins and xanthones, which results particularly active on gram +, gram - and anaerobic bacterial strains, with an activity comparable to that of the extract prepared from Krameria triandra.

15 DISCLOSURE OF THE INVENTION

It has surprisingly been found that the combination of extracts of some plants naturally having an antimicrobial activity, specifically extracts or pure compounds from different species of Krameria, preferably 20 Krameria triandra, and from Mesua ferrea, with substances such as ximeninic acid and with saponins such as those obtainable from Olax dissitiflora, Aesculum hippocastanum, Centella asiatica, Terminalia sericea, Glycyrrhiza glabra, with or without the addition of low 25 molecular fatty acids such as lauric acid, myristic, isomyristic etc., is highly active in the treatment of acne.

The combination of this mixture of antimicrobial agents with ximeninic acid and with natural compounds 30 having antiinflammatory activity, allows to obtain a nearly complete disappearance of the acne manifestations

and an effective prevention of the acne development. Particularly effective proved a combination of the antimicrobial agents with ximeninic acid, lauric acid (one of the main constituents of the lipophilic extract of *Serenoa repens*) and a saponin selected from those extractable from *Olax dissitiflora*, *Aesculum hippocastanum*, *Centella asiatica*, *Terminalia sericea*, *Glycyrrhiza glabra*, preferably those extracted from *Aesculum hippocastanum* and *Centella asiatica*.

10 **PHARMACOLOGICAL STUDIES**

Among the various combinations tested, those which showed the best clinical results contain 0.1 to 0.5% of extract of *Krameria triandra*, preferably 0.2%, 0.1 to 0.5% of extract of *Mesua ferrea*, preferably 0.25%, 0.2 to 1% of ximeninic acid, preferably 0.6%, 0.1 to 0.4% of lauric acid, preferably 0.2%, and 0.35 to 1% of escin, preferably 0.5%.

The antiacne activity has been tested on 30 patients of both sexes, of the age of 18 to 35 years. 20 Patients have been treated with 0.5 cm of the formulation twice a day for 45 consecutive days. The untreated part of the face has been used as the control. At the end of the treatment the number of papules, pustoles and comedos (A), the sebum concentration (B) and the presence of *Propionibacterium acnes* in the exudate from the pustoles and comedos (C) have been evaluated.

The results obtained are reported in the following Table.

4
Table

	TREATMENT	% REDUCTION		
		A	B	C
5	None	5	2.3	0
	Formulation 1 (Ex. IV)	70	13.1	80
10	Formulation 2 (Ex. V)	50	12.4	70
	Formulation 3 *	20	4	20

15 * formulation containing ximeninic acid and escin β -sitosterol (EP 283713).

The present invention, therefore, relates to pharmaceutical and cosmetic formulations with antiacne activity, which can be administered topically (gels, 20 creams, lotions, milks and solid preparations) containing the combinations described above. Said formulations will be prepared according to conventional methods well known in pharmaceutical technique, as those described in "Remington's Pharmaceutical Handbook", Mack Publishing Co., N.Y., USA, together with suitable excipients, in particular antioxidants.

25 The following examples illustrate the invention in further detail.

Example I - Preparation of the lipophilic extract of 30 Mesua ferrea

1 kg of finely ground buds of Mesua ferrea is

5

extracted in a 5 l extractor with CO₂ in hyper-critic conditions; a first extraction is carried out at 34°C and 90 bars of pressure, using about 25 l of carbon dioxide; the resulting extract is discarded and the 5 vegetable material is subjected to a second extraction, increasing temperature to 45°C and pressure to 220 bar. 15.6 g of a very thick oil of orange colour are obtained. This oil can be used directly as such or subjected to further fractionations by means of 10 conventional chemical separations. The extract is preferably used as such.

Example II - Preparation of the extract of Krameria triandra

2 kg of bark of the root of Krameria triandra, 15 after grinding, are extracted three times with 5 l each of acetone; the combined extracts are concentrated to small volume and the concentrate is taken up in 0.8 l of acetone:water 1:1 (v/v). The resulting suspension is extracted twice with 0.5 l of methylene chloride, the 20 chloromethylene phase is dried over anhydrous sodium sulfate, then concentrated to dryness. 85 g of a reddish solid are obtained, containing about 26% of Eupomatenoid 6 and 14% of 2-(2,4-dihydroxyphenyl)-5-propenylbenzofuran.

Example III - Preparation of the extract of Mesua ferrea with hexane

1 kg of finely ground buds of Mesua ferrea is extracted 4 times with 3 l of hexane under reflux; the combined hexane extracts are decolourized with active 30 charcoal (5 g) and concentrated under vacuum to an oil. 14.5 g of extract are obtained, which can be used

6

without further fractionation.

Example IV - Preparation of a Water/Silicon emulsion

	Mesua Ferrea	0.25	g
	Krameria triandra	0.2	g
5	Ximeninic acid	0.60	g
	Lauric acid	0.20	g
	18-β Glycyrrhetic acid	0.50	g
	Propylene glycol	5.0	g
	Sodium Coccoylglutamate 25% sol.	2.0	g
10	Mineral oil and lanolin alcohols	2.5	g
	Octyl Octanoate	5.0	g
	Octododecyl Myristate	7.5	g
	Cetyl Dimethicone Copolyol	2.5	g
	Tetramer Cyclomethicone	5.0	g
15	Sodium Chloride	2.0	g
	Glycerin	2.5	g
	Imidurea	0.3	g
	Methylparaben	0.1	g
	Purified water	q.s. to	100.0 g.

Example V - Preparation of a Oil/Water emulsion

	Krameria Triandria	0.20	g
	Escin β-Sitosterol fitosoma ^R	0.50	g
	Ximeninic acid	0.50	g
	Lauric acid	0.20	g
25	Gliceryl Monostearate	3.00	g
	Alkyl C ₁₂ -Benzoate	7.00	g
	Silicon oil	0.50	g
	Carbomer	0.50	g
	Acrylate/C ₁₀₋₃₀ Alkylacrylate Crosspolymer	0.20	g
30	Sodium Lauryl Sulfate	1.00	g
	Propylene glycol	5.00	g

	Sodium hydroxide 10% sol.	1.50	g
	Imidurea	0.3	g
	Methylparaben	0.1	g
	Purified water	q.s. to	100.00 g.
5	Example VI - Oil/Water emulsion		
	Krameria Triandria	0.25	g
	Escin β -Sitosterol fitosoma ^R	0.50	g
	Lauric acid	0.20	g
	Polyglyceryl 8-pentastearate and behenyl		
10	alcohol and sodium stearoyl lactylate (Nikkhomulese 41 - Nikkho)	2.50	g
	Behenyl alcohol	1.50	g
	Squalane	7.00	g
	Trioctanoine	6.00	g
15	PPG-12/SMDI	2.00	g
	Butenyl glycol	5.00	g
	Xanthan gum	0.30	g
	Preservatives	q.s.	
	Purified water	q.s. to	100.00 g.

CLAIMS

1. Pharmaceutical and cosmetic formulations with antiacne activity containing:
 - 5 a) an antimicrobial hydrophilic extract of Krameria sp., or a pure compound from said extract and/or an antimicrobial lipophilic extract of Mesua ferrea;
 - b) ximeninic acid and/or lauric acid;
 - c) antiinflammatory saponins extracted from Olax dissitiflora, Aesculum hippocastanum, Centella asiatica, Terminalia sericea, Glycyrrhiza glabra.
- 10 2. Formulations according to claim 1, containing:
 - 0.1 to 0.5% of extract of Krameria triandra,
 - 0.1 to 0.5% of extract of Mesua ferrea,
 - 15 - 0.2 to 1% of ximeninic acid,
 - 0.1 to 0.4% of lauric acid
 - 0.35 to 1% of escin.
- 20 3. Formulations according to claim 2, containing:
 - 0.2% of extract of Krameria triandra,
 - 0.25% of extract of Mesua ferrea,
 - 0.6% of ximeninic acid,
 - 0.2% of lauric acid,
 - 0.5% of escin.
- 25 4. Formulations according to claim 1, in which the pure compound from the Krameria extract is Eupomatenoid 6 and 2-(2,4-dihydroxyphenyl)-5-propenylbenzofuran.
5. The use of:
 - 30 a) an antimicrobial hydrophilic extract of Krameria sp., or a pure compound from said extract and/or an antimicrobial lipophilic extract of Mesua ferrea;
 - b) ximeninic acid and/or lauric acid;

9

c) antiinflammatory saponins extracted from *Olax dissitiflora*, *Aesculum hippocastanum*, *Centella asiatica*, *Terminalia sericea*, *Glycyrrhiza glabra*,
for the preparation of a medicament with antiacne
5 activity.

6. The use according to claim 5, in which the pure compound from the Krameria extract is Eupomatenoid 6 and 2-(2,4-dihydroxyphenyl)-5-propenylbenzofuran.

INTERNATIONAL SEARCH REPORT

Int. Appl. No.
PCT/EP 97/05510

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61K35/78 A61K7/48 // (A61K35/78, 31:20)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 464 297 A (INDENA SPA) 8 January 1992 see abstract; claims 1,3,11; examples 11-14 ---	1,2,4-6
Y	EP 0 304 603 A (INDENA SPA) 1 March 1989 see claims 1,4; examples 5-7 ---	1,2,4-6
Y	EP 0 283 713 A (INDENA SPA) 28 September 1988 see abstract; claims 4,9-11; examples 19,20 ---	1,2,4-6
A	US 4 886 667 A (KITAGAKI KANSHIRO ET AL) 12 December 1989 see column 1-2; claim 1; example 2 ---	1-6 -/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

4

Date of the actual completion of the international search

20 January 1998

Date of mailing of the international search report

30/01/1998

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Gonzalez Ramon, N

INTERNATIONAL SEARCH REPORT

na Application No

1/EP 97/05510

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 274 058 A (SHAH ELADEVI) 13 July 1994 see page 7 - page 9; table 1 see abstract see page 12; claims 4,15 -----	1-6
A	PATENT ABSTRACTS OF JAPAN vol. 096, no. 005, 31 May 1996 & JP 08 012565 A (SHISEIDO CO LTD), 16 January 1996, see abstract -----	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

Interr. fil. A. Application No.

PCT/EP 97/05510

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0464297 A	08-01-92	AT 122565 T DE 69019517 D DE 69019517 T	15-06-95 22-06-95 14-12-95
EP 0304603 A	01-03-89	DE 3875425 A ES 2052645 T US 5104655 A	26-11-92 16-07-94 14-04-92
EP 0283713 A	28-09-88	DE 3883035 A DE 3883035 T ES 2058151 T HK 160895 A JP 63277691 A US 5118671 A US 5147859 A US 5166139 A	16-09-93 02-12-93 01-11-94 20-10-95 15-11-88 02-06-92 15-09-92 24-11-92
US 4886667 A	12-12-89	JP 1628831 C JP 2055404 B JP 62126128 A CH 670047 A DE 3640409 A FR 2593396 A GB 2184353 A,B SE 8605044 A	20-12-91 27-11-90 08-06-87 12-05-89 04-06-87 31-07-87 24-06-87 28-05-87
GB 2274058 A	13-07-94	GB 2304050 A,B	12-03-97